

Claims:

1. A method for making a carbon nanotube-based field emission display comprising steps of:

providing an insulative layer having a first surface;

depositing a layer of catalyst on the first surface of the insulative layer;

forming a spacer having a plurality of openings therein such that patterned areas of the layer of catalyst are exposed in the openings;

forming arrays of carbon nanotubes extending from the layer of catalyst in the patterned areas;

forming cathode electrodes on tops of the arrays of carbon nanotubes;

forming gate electrodes on a second, opposite surface of the insulative layer offset from the patterned areas;

removing portions of the insulative layer corresponding to the arrays of carbon nanotubes so as to expose the arrays of carbon nanotubes; and

attaching an anode electrode having a phosphor screen to the above obtained structure.

2. The method as described in claim 1, wherein a flatness of the first surface of the insulative layer is less than 1 micron.

3. The method as described in claim 1, wherein a thickness of the insulative layer is in the range from 1micron to 1000 microns.
4. The method as described in claim 3, wherein the thickness of the insulative layer is in the range from 10 microns to 200 microns.
5. The method as described in claim 1, wherein a thickness of the catalyst layer is in the range from 1 nanometer to 10 nanometers.
6. The method as described in claim 1, wherein the spacer is made of heatproof glass, insulative material coated metal, silicon, silicon oxide, ceramic or mica.
7. The method as described in claim 1, wherein a height of the spacer is in the range from 1micron to 1 mm.
8. The method as described in claim 8, wherein the height of the spacer is in the range from 10 microns to 500 microns.
9. The method as described in claim 1, wherein a height of the arrays of carbon nanotubes is approximately equal to that of the spacer.
10. The method as described in claim 1, wherein each cathode electrode further includes a negative feedback layer.
11. A method for making a carbon nanotube-based field emission display comprising steps of:

providing an insulative layer having a first surface;

depositing a protective layer on the insulative layer;

depositing a layer of catalyst on the protective layer;

forming a spacer having a plurality of openings therein such that patterned areas of the layer of catalyst are exposed in the openings;

forming arrays of carbon nanotubes extending from the layer of catalyst in the patterned areas;

forming a cathode electrode on a top of each of the arrays of carbon nanotubes;

forming a base having an inner contour mates with an outer contour of the cathode electrodes and the spacer so as to couple to the cathode electrodes and spacer;

forming gate electrodes on a second, opposite surface of the insulative layer offset from the patterned areas;

removing portions of the protective layer and the insulative layer corresponding to the arrays of carbon nanotubes so as to expose the arrays of carbon nanotubes;

and

attaching an anode electrode having a phosphor screen to the above obtained structure .

12. The method as described in claim 11, wherein a flatness of the first surface of the insulative layer is less than 1 micron.
13. The method as described in claim 11, wherein a thickness of the insulative layer is in the range from 1 micron to 1000 microns.
14. The method as described in claim 11, wherein a thickness of the protective layer is in the range from 10 nanometers to 100 nanometers.
15. The method as described in claim 11, wherein the insulative layer and the protective layer are removed by wet etching and dry etching respectively.
16. The method as described in claim 11, wherein a thickness of the layer of catalyst is in the range from 1 nanometer to 10 nanometers.
17. The method as described in claim 11, wherein the method further includes a step of cleaning the exposed surface of the arrays of carbon nanotubes after removing the portions of the protective layer and the insulative layer.
18. A method of making a carbon nanotube-based field emission display, comprising steps of:
  - providing a catalyst layer;
  - growing arrays of carbon nanotubes on said catalyst layer with roots of said arrays of carbon nanotubes extending therefrom;
  - providing a barrier beside said arrays of carbon nanotubes;
  - applying a cathode electrode upon tips of said growing arrays of carbon

nanotubes under a condition that the cathode electrode is supported by said barrier;

removing portions of said catalyst layer around said roots;

providing a gate electrode around said roots; and

locating an anode electrode spatially away from said roots opposite to said cathode electrode.